Poultry Litter Subcommittee Update

Updated Summary & Draft Recommendations

Agriculture Workgroup Meeting

May 9, 2013

Annapolis, Maryland

Committee Membership

Jim Glancey	UD
Mark Dubin	UM
Emma Giese	CBPO
Mark Davis	DDA
Tom Basden	WVU
Bill Brown	UD
Glenn Carpenter	USDA NRCS
Frank Coale	UM
Jason Dalrymple	WVDA
Doug Goodlander	PA DEP
Matt Johnston	CBPO
Bobby Long	VA DCR

Jen Nelson	USDA NRCS
Jerry Ours	WVDA
Paul Patterson	Penn State
Jim Pease	VT
Royden Powell	MDA
Tim Sexton	VA DCR
Kelly Shenk	EPA
Trish Steinhilber	UM
Jeff Sweeney	EPA
Jon Moyle	UM
Jennifer Weld	PSU
Hank Zygumnt	Keith Campbell

Summary of Poultry Data Sets Across the Watershed

- Delmarva
  - Chickens
  - Data Sets: 1996-1999, 2000-2005, 2006-2011
- Virginia:
  - Chickens, Turkeys
  - Data Sets: 2001-2005, 2006-2012
- West Virginia
  - Chickens, Layers, Pullets, Turkeys
  - Data Sets: 1996-1999, 2000-2005, 2006-2012
- Overall
  - 21 data sets summarizing over 8000 data points within the watershed.

Typical Data Set - Delmarva

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	2006 to 2011
No. of Data	3696
Avg. TN Concentration	57.1 lbs/ton
TN Range*	55.4 to 60.3 lbs/ton
Avg. TP Concentration	20.1 lbs/ton
TP Range*	17.9 to 21.3 lbs/ton
Moisture Content	30.1 % w.b.
Moisture Content Range*	28.0 to 32.1 % w.b.
Manure Generation	1.5 tons/1000 birds
Manure Generation Range	0.5 to 4.6 tons/1000 birds

* Based on annual averages

Comments

- All manure samples analyzed by the DDA laboratory.
- Bird sizes: 60% roasters, 40% broilers
- Average bird weight = 7.1 lbs
- Manure generation based on a total of 702 poultry house cleanouts or crustouts
- Average NH3-N = 10.6 lbs/ton (Range: 8.0 to 12.4 lbs/ton)
- 2012 data still being summarized by DDA

Delmarva Summary

2006-2011

Parameter	Chickens
No. of Data	3696
Avg. TN Concentration (lbs/ton)*	57.1
Avg. TP Concentration (lbs/ton)*	20.1
Moisture Content (%)*	30.1
Manure Generation (lbs/1000 birds)*	2990

Notes:

- All samples analyzed by the DDA Laboratory
- Bird types are 40% broilers and 60% roasters
- Average bird weight is 7.1 pounds.
- Average NH3-N = 10.6 lbs/ton
- Manure generation based on 702 data points
- * reported on a wet basis

Virginia Summary

2006-2012

Parameter	Chickens	Turkeys
No. of Data	1874	839
Avg. TN Concentration (lbs/ton)*	71	79
Avg. TP Concentration (lbs/ton)*	15	16
Moisture Content (%)*	27	29
Manure Generation (lbs/1000 birds)*	2,500	16,000

Notes:

- All chicken samples analyzed by the DCR contracted labs
- All turkey samples analyzed by the Clemson Ag Services Laboratory
- For turkeys, manure generation is 12,000 lbs/1000 hens and 20,000 lbs/1000 toms
- For chickens, bird types are 82% broilers and 18% layer/breaders
- * reported on a wet basis

West Virginia Summary

2006-2012

Parameter	Chickens	Layers	Pullets	Turkeys
No. of Data	330	198	36	145
Avg. TN Concentration (lbs/ton)*	61	53	52	72
Avg. TP Concentration (lbs/ton)*	20	26	32	24
Moisture Content (%)*	33	35	26	32
Manure Generation (lbs/1000 birds)	2,000	22,000	5,500	9,900

Notes:

- All samples analyzed by the WVDA Laboratory
- Average chicken weight is 4 lbs market weight.
- * reported on a wet basis

Comparison Across the Watershed – *Chickens*

2006-2012

Wet Basis

Parameter	Units	Delmarva	Virginia	West Virginia
Total N	lbs/ ton	57	71	61
Total P	lbs/ton	20	15	20
Manure Generation	lbs/1000 birds	2,990	2,500	2,000
Moisture	%	30	27	33

Dry Basis

Parameter	Units	Delmarva	Virginia	West Virginia
Total N	lbs/ ton	81	97	91
Total P	lbs/ton	29	21	30
Manure Generation	lbs/1000 birds	2086	1,825	1,340

Comparison Across the Watershed – *Chickens 2006-2012*

Parameter	Units	Delmarva	Virginia	West Virginia
N Generation	lbs/1000 birds	84.9	88.8	61.0
P Generation	lbs/1000 birds	29.8	18.8	20.0

Summary

- PLS committee has summarized regional poultry litter nutrient and volume data.
- Sub-committee recommendations are based on more than 8,000 data within the watershed.
- Differences exist between states/regions for both N and P concentrations as well as manure generation volumes.
- These differences are likely due to several things including different grow-out practices, genetics, feed technologies, preferred bird sizes, etc.
- Poultry population estimates are a new element to be developed.

Additional Data Requests From the Modeling Group

- Need data for each year.
  - Average bird life.
  - Average bird size.
  - More detail and resolution for the manure generation estimates (lbs per 1000 birds)
  - Use PLS data template to convey information
- Status:
  - VA has completed the template.
  - Delmarva and WV currently working on populating the template.
- Alternative approach that reflects current industry practices to estimate bird populations.

Draft Recommendations

For the Current Model

- Data suggests a state/regional approach.
- All states excepting PA and NY have databases in place to track and report average N and P concentration data by bird type on an annual basis. PA is investigating data sources.
- PLS recommends to allow each state to report annual average N and P manure concentrations and manure generation volumes for their state/region.

Draft Recommendations cont.

- PLS recommends to directly utilize annual average N and P concentration data with manure generation data where available (where not available, the existing model data analysis would remain).
- The new annual concentration data would sub-plant the current model data and analysis assumptions based on excreted values, and replace BMP reductions associated with feed additives (Phytase), and litter amendments.
- The new manure volume data per 1k birds would be applied to the USDA-NASS Agriculture Census projected livestock populations to sub-plant the current manure volume assumptions.

Draft Recommendations

For the Next (v6.x) Model

- Develop new model data and analysis methods for representing poultry litter nutrient generation and volumes to calculate mass nutrients.
- Implement capacity in NEIEN for data reporting on annual average N and P concentrations by bird type by state/region.
- States responsible for collecting and reporting annual NEIEN data updates along with annual progress data.
- Update manure volume numbers as new data becomes available.

Questions?

Comments?

Delmarva

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	1996 to 1999
No. of Data	105
Avg. TN Concentration	59.3 lbs/ton
TN Range*	49.3 to 67.1 lbs/ton
Avg. TP Concentration	24.1 lbs/ton
TP Range*	22.6 to 25.7 lbs/ton
Moisture Content	Unknown
Moisture Content Range*	Unknown
Manure Generation	1.5 tons/1000 birds
Manure Generation Range	Unknown

* Based on annual averages

Comments

- Source of data is the Sussex Co. Delaware Conservation District via Jennifer Nelson, MD-NRCS.
- Analysis performed by Agri-Analysis and the DDA lab.
- No statistical difference between the two labs.

Delmarva

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	2000 to 2005
No. of Data	999
Avg. TN Concentration	57.6 lbs/ton
TN Range*	53.6 to 62.9 lbs/ton
Avg. TP Concentration	20.6 lbs/ton
TP Range*	17.8 to 24.0 lbs/ton
Moisture Content	31.6 % w.b.
Moisture Content Range*	28.1 to 35.0 % w.b.
Manure Generation	1.5 tons/1000 birds
Manure Generation Range	Unknown

* Based on annual averages

Comments

- All manure samples analyzed by the DDA laboratory.
- Only two years of moisture content data (04 and 05).

Delmarva

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	2006 to 2011
No. of Data	3696
Avg. TN Concentration	57.1 lbs/ton
TN Range*	55.4 to 60.3 lbs/ton
Avg. TP Concentration	20.1 lbs/ton
TP Range*	17.9 to 21.3 lbs/ton
Moisture Content	30.1 % w.b.
Moisture Content Range*	28.0 to 32.1 % w.b.
Manure Generation	1.5 tons/1000 birds
Manure Generation Range	0.5 to 4.6 tons/1000 birds

* Based on annual averages

Comments

- All manure samples analyzed by the DDA laboratory.
- Bird sizes: 60% roasters, 40% broilers
- Average bird weight = 7.1 lbs
- Manure generation based on a total of 702 poultry house cleanouts or crustouts
- Average NH3-N = 10.6 lbs/ton (Range: 8.0 to 12.4 lbs/ton)
- 2012 data still being summarized by DDA

Virginia

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	2001-2005
No. of Data	1709
Avg. TN Concentration	65 lbs/ton
TN Range*	58 – 73 lbs/ton
Avg. TP Concentration	19 lbs/ton
TP Range*	14 – 23 lbs/ton
Avg. Moisture Content	26 % w.b.
Moisture Content Range*	12 - 32 % w.b.
Manure Generation	1.25 tons/1000 birds
Manure Generation Range	0.8 – 1.5 tons/1000 birds

* Based on annual averages

Comments

- All Samples analyzed by DCR contracted labs
- Bird type: 82% broiler, 18% layer/breeder
- Manure generation based on calibrations, load counts, and observed integrator differences

Virginia

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	2006-2012
No. of Data	1874
Avg. TN Concentration	71 lbs/ton
TN Range*	61 – 78 lbs/ton
Avg. TP Concentration	15 lbs/ton
TP Range*	12 – 23 lbs/ton
Avg. Moisture Content	27 % w.b.
Moisture Content Range*	24 - 31 % w.b.
Manure Generation	1.25 tons/1000 birds
Manure Generation Range	0.8 – 1.5 tons/1000 birds

* Based on annual averages

Comments

- All Samples analyzed by Clemson Agricultural Service Lab
- Bird type: 82% broiler, 18% layer/breeder
- Manure generation based on calibrations, load counts, and observed integrator differences

Virginia

Nutrient Content and Volume Generated - Turkeys

Parameter	Value
Time Range	2001-2005
No. of Data	784
Avg. TN Concentration	64 lbs/ton
TN Range*	60 – 67 lbs/ton
Avg. TP Concentration	19 lbs/ton
TP Range*	12 – 25 lbs/ton
Avg. Moisture Content	27% w.b.
Moisture Content Range*	13 – 32% w.b.
Manure Generation	8 tons/1000 birds
Manure Generation Range	6 -10 tons/1000 birds

* Based on annual averages

Comments

- All Samples analyzed by DCR contracted labs
- Bird Type: 90% finishing turkeys, 10% Breeding turkeys
- Manure generation based on calibrations, load counts, and observed integrator and gender differences
- 6 tons for hens and 10 tons for toms

Virginia

Nutrient Content and Volume Generated - Turkeys

Parameter	Value
Time Range	2006-2012
No. of Data	839
Avg. TN Concentration	79 lbs/ton
TN Range*	68 – 83 lbs/ton
Avg. TP Concentration	16 lbs/ton
TP Range*	14 – 23 lbs/ton
Avg. Moisture Content	29% w.b.
Moisture Content Range*	26 – 33% w.b.
Manure Generation	8 tons/1000 birds
Manure Generation Range	6 -10 tons/1000 birds

* Based on annual averages

Comments

- All Samples analyzed by Clemson Agricultural Service Lab
- Bird Type: 90% finishing turkeys, 10% Breeding turkeys
- Manure generation based on calibrations, load counts, and observed integrator and gender differences
- 6 tons for hens and 10 tons for toms

West Virginia

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	1995 – 1999
No. of Data	383
Avg. TN Concentration	65 lbs/ton
TN Range*	62-75 lbs/ton
Avg. TP Concentration	25 lbs/ton
TP Range*	23-28 lbs/ton
Avg. Moisture Content	29 % w.b.
Moisture Content Range*	28-30 % w.b.
Manure Generation	1 ton/1000 birds
Manure Range	.75-1.25 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Average 4lbs market weight.
- Past fiscal year showed a 32% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	2000 – 2005
No. of Data	442
Avg. TN Concentration	56 lbs/ton
TN Range*	46-62 lbs/ton
Avg. TP Concentration	23 lbs/ton
TP Range*	20-25 lbs/ton
Avg. Moisture Content	30 % w.b.
Moisture Content Range*	26-37 % w.b.
Manure Generation	1 ton/1000 birds
Manure Range	.75-1.25 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Average 4lbs market weight.
- Past fiscal year showed a 32% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Chickens

Parameter	Value
Time Range	2006 – 2012
No. of Data	330
Avg. TN Concentration	61 lbs/ton
TN Range*	53-71 lbs/ton
Avg. TP Concentration	20 lbs/ton
TP Range*	17-24 lbs/ton
Avg. Moisture Content	33 % w.b.
Moisture Content Range*	30-36 % w.b.
Manure Generation	1 ton/1000 birds
Manure Range	.75-1.25 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Average 4lbs market weight.
- Past fiscal year showed a 32% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Layers

Parameter	Value
Time Range	1995 – 1999
No. of Data	150
Avg. TN Concentration	48 lbs/ton
TN Range*	43-53 lbs/ton
Avg. TP Concentration	30 lbs/ton
TP Range*	29-31 lbs/ton
Avg. Moisture Content	29 % w.b.
Moisture Content Range*	24-32 % w.b.
Manure Generation	11 tons/1000 birds
Manure Range	10-12 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Average 7 lbs.
- Past fiscal year showed a 23% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Layers

Parameter	Value
Time Range	2000 – 2005
No. of Data	167
Avg. TN Concentration	47 lbs/ton
TN Range*	36-51 lbs/ton
Avg. TP Concentration	28 lbs/ton
TP Range*	25-31 lbs/ton
Avg. Moisture Content	31 % w.b.
Moisture Content Range*	26-35 % w.b.
Manure Generation	11 tons/1000 birds
Manure Range	10-12 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Average 7 lbs.
- Past fiscal year showed a 23% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Layers

Parameter	Value
Time Range	2006 – 2012
No. of Data	198
Avg. TN Concentration	53 lbs/ton
TN Range*	43-58 lbs/ton
Avg. TP Concentration	26 lbs/ton
TP Range*	22-29 lbs/ton
Avg. Moisture Content	35 % w.b.
Moisture Content Range*	28-42 % w.b.
Manure Generation	11 tons/1000 birds
Manure Range	10-12 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Average 7 lbs.
- Past fiscal year showed a 23% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Pullets

Parameter	Value
Time Range	1995 – 1999
No. of Data	15
Avg. TN Concentration	38 lbs/ton
TN Range*	31-45 lbs/ton
Avg. TP Concentration	26 lbs/ton
TP Range*	19-31 lbs/ton
Avg. Moisture Content	27 % w.b.
Moisture Content Range*	21-32 % w.b.
Manure Generation	2.75 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Past fiscal year showed a 20% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Pullets

Parameter	Value
Time Range	2000 – 2005
No. of Data	31
Avg. TN Concentration	43 lbs/ton
TN Range*	40-50 lbs/ton
Avg. TP Concentration	29 lbs/ton
TP Range*	18-33 lbs/ton
Avg. Moisture Content	25 % w.b.
Moisture Content Range*	19-33 % w.b.
Manure Generation	2.75 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Past fiscal year showed a 20% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Pullets

Parameter	Value
Time Range	2006 – 2012
No. of Data	36
Avg. TN Concentration	52 lbs/ton
TN Range*	44-54 lbs/ton
Avg. TP Concentration	32 lbs/ton
TP Range*	16-43 lbs/ton
Avg. Moisture Content	26 % w.b.
Moisture Content Range*	18-28 % w.b.
Manure Generation	2.75 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Past fiscal year showed a 20% P205 reduction from pre-phytase years (95-99)

West Virginia

Nutrient Content and Volume Generated - Turkeys

Parameter	Value
Time Range	1994 – 1999
No. of Data	230
Avg. TN Concentration	51 lbs/ton
TN Range*	44-85 lbs/ton
Avg. TP Concentration	22 lbs/ton
TP Range*	19-28 lbs/ton
Avg. Moisture Content	32% w.b.
Moisture Content Range*	23-36 % w.b.
Manure Generation	9 tons/1000 birds
Manure range	6-13 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Weight ranges differ with different types of turkey operations
- Past fiscal year showed a 12% P205 reduction from pre-phytase years (94-99)

West Virginia

Nutrient Content and Volume Generated - Turkeys

Parameter	Value
Time Range	2000 – 2005
No. of Data	148
Avg. TN Concentration	58 lbs/ton
TN Range*	50-68 lbs/ton
Avg. TP Concentration	27 lbs/ton
TP Range*	22 lbs/ton
Avg. Moisture Content	27 % w.b.
Moisture Content Range*	26-35 % w.b.
Manure Generation	9 tons/1000 birds
Manure range	6-13 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Weight ranges differ with different types of turkey operations
- Past fiscal year showed a 12% P205 reduction from pre-phytase years (94-99)

West Virginia

Nutrient Content and Volume Generated - Turkeys

Parameter	Value
Time Range	2006 – 2012
No. of Data	145
Avg. TN Concentration	72 lbs/ton
TN Range*	64-80 lbs/ton
Avg. TP Concentration	24 lbs/ton
TP Range*	21-29 lbs/ton
Avg. Moisture Content	32 % w.b.
Moisture Content Range*	27-34 % w.b.
Manure Generation	9 tons/1000 birds
Manure range	6-13 tons/1000 birds

* Based on annual averages

Comments

- All manure analyzed by the WVDA Laboratory
- Weight ranges differ with different types of turkey operations
- Past fiscal year showed a 12% P205 reduction from pre-phytase years (94-99)

ASAE Standard, 2003

Table 2 - Fresh manure production and characteristic per 1,000 lb live animal mass per day

Parameter	Units*		Animal Type! Dairy	Beef	Veal	Sv. ne	Sheep	Goat	Horse	Layer	Broiler	Tur1<ey	Duck
Total manure*	b	meanf	86	58	62	84	40	41	51	64	85	47	110
		std. deviation	17	17	24	24	11	8.6	7.2	19	13	13	**
Urine	b	mean	26	18	••	39	15	**	10	••	••	**	**
		std. deviation	4.3	4.2	••	4.8	3.6	••	0.74	••	••	••	**
Density	IMf	mean	62	63	62	62	64	63	63	60	63	63	**
		std. deviation	4.0	4.7	••	1.5	4.0	••	5.8	2.4	••	••	**
Total solids	b	mean	12	8.5	5.2	11	11	13	15	16	22	12	31
		std. deviation	2.7	2.6	2.1	6.3	3.5	1.0	4.4	4.3	1.4	3.4	15
Volati e solids	b	mean	10	7.2	2.3	8.5	9.2	**	10	12	17	9.1	19
		std. deviation	0.79	0.57	••	0.66	0.31	••	3.7	0.84	1.2	1.3	**
Biochemical oxygen demand, 5-day	b	mean	1.6	1 6	1.7	3.1	1.2	••	1.7	3.3	••	2.1	4.5
		std. deviation	0.48	0.75	••	0.72	0.47	**	0.23	0.91	••	0.46	**
Chemical oxygen demand	b	mean	11	7.8	5.3	8.4	11	**	••	11	16	9.3	27
		std. deviation	2.4	2.7	••	5.3	2.5	••	••	2.7	18	1.2	**
pH		mean	7.0	7.0	8.1	7.5	••	••	7.2	6.9	••	••	**
		std. deviation	0.45	0.34	••	0.57	••	**	••	0.56	••	**	**
Total l<jeldahl nitrogen	b	mean	0.45	0.34	0.27	0.52	0.42	0.45	0.30	0.84	1.1	0.62	1.5
		std. deviation	0.096	0.073	0.045	0.21	0.11	0.12	0.063	0.22	0.24	0.13	0.54
Ammonia nitrogen	b	mean	0.079	0.006	0.12	0.29	••	**	••	0.21	••	0.080	**
		std. deviation	0.083	0.052	0.016	0.10	••	••	••	0.18	••	0.018	**
Total pllosphDrus	b	mean	0.094	0.002	0.056	0.18	0.007	0.11	0.071	0.30	0.30	0.23	0.54
		std. deviation	0.024	0.027	0.011	0.10	0.030	0.016	0.026	0.001	0.053	0.093	0.21

ASAE Standard, 2003 (cont')

*All values wet basis.

†Differences within species according to usage exist, but sufficient fresh manure data to list these differences was not found. Typical live animal masses for which manure values represent are: dairy, 1400 lb; beef, 800 lb; veal, 200 lb; swine, 135 lb; sheep, 60 lb; goat, 140 lb; horse, 1000 lb; layer, 4 lb; broiler, 2 lb; turkey, 15 lb; and duck, 3 lb.

‡Feces and urine as voided.

§Parameter means within each animal species are comprised of varying populations of data. Maximum numbers of data points for each species are: dairy, 85; beef, 50; veal, 5; swine, 58; sheep, 39; goat, 3; horse, 31; layer, 74; broiler, 14; turkey, 18; and duck, 6.

‖All nutrients and metals values are given in elemental form.

#Mean bacteria colonies per 1,000 lb animal mass multiplied by 10^{10}. Colonies per 1,000 lb animal mass divided by lb total manure per 1,000 lb animal mass multiplied by density (lb/ft^3) equals colonies per ft^3 of manure.

**Data not found.

Case Study: *Sussex County, Delaware*

	EPA/ASAE Approach	units
Bird Inventory	43,620,576	#of birds on any given day (2007 Census)
Animal Unit Definition	455	#of birds per 1000 lbs of animal mass
Total Animal Unit Inventory	95,869	animal units on any given day
Manure Production	85	lbs of manure per animal unit per day
Total Manure Produced	1,487,174	tons wet excretion per year
Nitrogen Concentration	0.0129	lbs TKN per lb of manure
Phosphorous Concentration	0.0035	lbs Total P per lb of manure
Total Nitrogen Produced	38,491,563	lbs Total N per year
Total Nitrogen Not Volatized	35,332,221	lbs Total N per year
Total Phosphorous Produced	10,497,699	lbs Total P per year
Total Phosphorous Produced with 16% phytase credit	8,818,067	lbs Total P per year

	UD/DDA/UMD Approach	units
No of Birds	43,620,576	#of birds
No of Flocks per Year	4.8	flock per year
Total Number of Birds Produced	209,378,765	birds per year
Manure Production	1.25	tons per 1000 birds
Total Manure Produced	261723	tons per year
Nitrogen Concentration	56.80	lbs Total N per ton
Phosphorous Concentration	19.50	lbs Total P per ton
Total Nitrogen Produced	14,839,720	lbs Total N per year
Total Phosphorous Produced	5,103,607	lbs Total P per year